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*On a new Scirpus from Beluchistan and certain of its allies.*—By J. R. DRUMMOND, I.C.S., B.A., F.L.S., etc.

[ Read July 6th, 1904.]

A small consignment of Cyperaceæ and other aquatic plants lately received in the Royal Herbarium at Sibpur from the Seistan Arbitration Mission, and made over to the writer for examination, included a *Scirpus* which does not appear to have been described hitherto. The hypogynous bristles are plumose, and the stigma bifid, so that it would fall, as the species are arranged in Fl. Br. Ind. V. 653—663, under *Scirpus proper* near *Scirpus litoralis*, but study of the material in the Calcutta Herbarium has suggested that a short review of *S. litoralis* and its nearer allies may be useful.

In the Fl. Br. Ind. (V. 659) Schrader's *litoralis* is given priority over Vahl's "*subulatus*," the two being taken as equivalent; but it will be convenient in this paper to commence with "*subulatus*," which Vahl

(En. II. 268, 1805) gives as an inhabitant of the Nicobars (collector not stated) and describes it as follows:—

*Aphyllus spicis oblongis, squamis carina pubescentibus stylo trifido, involucri foliolum longius rigidum læve, squamis emarginatis \* \* \* setae apice plumosae \* \* \**

He distinguishes his plant from *S. lacustris* by the setae being plumose, not retrorsely echinate.

Who collected Vahl's plant and where specimens are to be seen, I have so far failed to discover.

In 1806 Schrader's *Flora Germanica* appeared, in which he distinguished *Scirpus litoralis* as an undescribed species resembling *S. triquetus* of Willd., between which and *S. maritimus* he inserted it.

His figure shews a *Scirpus* of the *triqueter* stamp with two styles and what may have been two plumose setae, also a membranous ligulate body which looks like a filament wanting its anther or a 3rd (glabrous) segment of the perigonium; the nut is shown as obovate and acuminate, without any trace of a style base; the stigma is bifid: glumes faintly carinate, hardly acute, entire, and not ciliate; spikelets less than  $\frac{1}{2}$  an inch in length.

His description is not strictly in accord with his figure, more particularly as regards the glumes; these he says are very blunt and tipped with a long mucro, which is more or less reflexed.

Bentham (*Fl. Austr.* VII 334) remarks that the essential character derived from the bristles of *S. littoralis* was overlooked both by Linnæus and Schrader, but it must be noted that the plant was not taken up by Linnæus. Schrader records that he had not seen ripe fruit, but his figure shews the plumose bristles as to which the text is silent.

His plant was found by Wulfenius in marshes near Duino and Monfalcone on the Adriatic (Gulf of Trieste); I have not seen specimens.

In 1812 *Scirpus fimbriatus* was published by Delile as an Egyptian species. The figure and description suggest that his plant differs from that of the northern shores of the Mediterranean if at all, as follows:—

- (a) main involucre bract hardly exceeding the inflorescence;
- (b) inflorescence more compact, peduncles stiffer;
- (c) achene obcordate, rounded at the apex, hardly acuminate, style-base manifest;

- (d) sheaths producing laminæ which attain 3 inches in length by  $\frac{1}{3}$  of an inch in breadth at the base and are flaccid, narrowly triangular-acuminate in outline, acute at the tip, and spreading.

*Note.*—The rootlets are scanty and feeble (in the figure).

In 1820 Carey's Edition of Roxburgh's Flora Indica appeared in which *Scirpus pectinatus* is described, as a native chiefly of "marshy places where the soil is sandy." There is a picture of this among the unpublished drawings in Herb. H.B.C. which differs from *S. fimbriatus* Delile in the sheaths bearing no laminæ, in the shape of the glumes which are acute, not at all emarginate, and by the lax and drooping panicle.

There are specimens in the Calcutta Herbarium gathered in salt marshes near Sealdah in November 1860 and December 1866, by Kurz, which appear to be the plant of Roxburgh and have been so named by the finder.

Wall. 3506 which is from Herb. Heyne, and was therefore probably collected on the coast of the Peninsula, agrees fairly well with *S. pectinatus* also.

There are also two Ceylon examples (C. P. 831) which have been named *S. pectinatus* Roxb. in Thwaites' handwriting.

In Wight's "Contributions," (1834) the Indian *Oyperaceæ* were reviewed,—chiefly on material in the Herbaria of Wight himself, of Wallich, Royle, and Lindley,—by Prof. Nees von Esenbeck, who divided off sundry types from *Scirpus* and created, among other new genera, *Malacochæte*, which in his Tribe III (*Scirpeæ*) is referred to a sub-tribe B. with the glumes (squamæ) arranged spirally (plurifariæ), and to that particular group of the same which has a perigonium (of bristles).

In its group *Malacochæte* is distinguished by the "setæ" which constitute the perigonium being linear, membranaceous, and ciliate.

He enumerates a single Indian species only, viz., *Malacochæte pectinata*, of which the synonymy is given as follows:—

*Scirpus pectinatus*, Roxb. Fl. Ind. I. p. 218 (Ed. Wall.) I. 210.

*S. campestroides*, Roxb. in Co. Merc. I. Or. Mus. tab. 744 (fide Arnott)

*S. plumosus*, R. Br. ? Fl. Nov. Holl.

As localities are mentioned sandy marshes of the *E. I. Peninsula* (Roxburgh, Wight), *Nepal* (Royle).

I have not traced *S. campestroides* of Roxburgh's unpublished drawing, but it seems likely that the Nepal habitat is an error, and that *S. pectinatus* was collected on the coast or in tidal rivers exclusively.

Wight's plant was doubtless that which is represented from Ceylon in Herb. H.B.C., named *S. pectinatus* Roxb. and *S. subulatus*, Vahl by Mr. C. B. Clarke subsequently.

Royle's specimens may have been from the Dehra Dun or Kumaon, and to whatever plant they belonged were presumably distinct (as a sub-species at least) from the estuarial *Scirpus pectinatus*.

In the Flora Germanica (VIII p. 42 Ic. CCCIX) Reichenbach has described and figured Schrader's Istrian species, giving as additional localities the Venetian Islands, and the synonymy as

- = *S. mucronatus*, Scopoli
- = *S. fimbrisetus*, Delile
- = *Fimbristylis mucronatum* (sic), Vahl
- = *Malacochæte littoralis* N. von E.
- = *S. balearicus*, Willd. ined.

From the last synonym it appears that a similar or identical species had been collected in the Balearic Islands also. Reichenbach's figure represents a plant agreeing fairly as regards the sheaths and inflorescence with *S. pectinatus* of Roxburgh, but differing from that widely as regards the shape of the glumes.

From Delile's plate of *S. fimbrisetus* the Fl. Germ. Icon differs as regards the length of the stigma and in shewing the glumes as ciliate on the margins. It adds a detail which may have escaped previous observers as regards the anthers, which are shown as adnate to a strap-shaped filament, broadened upwards, and produced above the cells into a short semicircular crest or expansion, which is bristly or minutely plumose on the margin.

The achene is depicted as plano-convex, shortly stalked, and obcordate, with a manifest style base. The culm for the most part of its length is triquetrous, or to speak quite correctly plano-convex, the section of the convexity giving a curve which is nearly a parabola.

Nyman's Conspectus gives the range of Schrader's *S. littoralis* as the whole N. shore of the Mediterranean and its European islands from Crete westwards, and it may be taken that the plant of Delile is a sub-species of *S. littoralis* or a very closely allied form.



In 1855 Steudel (Synopsis Pl. Cyper.) described the following species of *Scirpus* belonging to the same group as *S. litoralis* Schrad, viz.—

## SCIRPUS.

No.	Species.	Habitat,	Character,
40	<i>Philippi</i> , Tineo ...	Sicily ...	Stigmas 3.
41	<i>plumosus</i> , R. Br. ...	N. Holland ...	Culm terete, glume-margins naked.
42	<i>Meyenii</i> , Nees ...	N. Holland and Sandwich Islands	Style trifid, achenes lead-coloured, punctate gibbous.
43	<i>Brayii</i> , Hoppe ...	Baltic ...	Style trifid, glumes ciliate above.
44	<i>subulatus</i> , Vahl ...	India ...	Style deeply bifid, achenes rust-coloured, compressed, smooth.
45	<i>litoralis</i> , Schrad ...	Mediterranean, etc.	Style bifid, glumes blood-red to rust-coloured, achenes plano-convex, punctulate.
46	<i>Desprauxii</i> , Steud. ...	Cuba ...	Style bifid, glumes not mucronate.
50	<i>Jatora</i> , Kunth (? <i>Tatora</i> ) ...	Peru ...	Culm triangular, style bifid, glumes not aristate.
51	<i>Pterolepis</i> , Kunth	Cape G. Hope ...	Culm terete, style bifid, glumes strongly ciliated.

It appears that Schrader in a memoir that is scarcely accessible had referred his *S. litoralis* to a new genus *Pterolepis* as *P. scirpoides*, including in it the Cape plant which is No. 51 of Steudel, but Nees demolished *Pterolepis*, at the same time erecting *Malacochæte* for the reception of the Roxburghian species having a bifid style and plumose setæ and certain extra-Indian forms, in which the Australian plant of Brown was doubtfully included.

Steudel gives *S. pectinatus* of Roxburgh as *S. subulatus* of Vahl, and reduces *fimbrisetus* of Delile to *S. litoralis* of Schrader, but under these he says nothing of the Neesian "*Malacochæte*."

*S. Philippi* is a doubtful plant reduced by some authorities to *S. litoralis* though the style is described as trifid. It is only found in Sicily and may be a good species, but the writer has no means of placing it at present. *S. Brayii* of Hoppe is referred to *S. lacustris*, and is therefore not a *Malacochæte*; so that if for the purposes of this note we

put the American species on one side we have left the following, viz :—

*S. plumosus*,—R. Brown

*S. Meyenii*,—Nees.

*S. subulatus*,—Vahl

*S. litoralis*,—Schrader.

*S. Meyenii* differs from the other plumosæ by the trifid style, and the same applies to the true *S. subulatus* of Vahl, so that of “*Malacochæte*” with a bifid stigma there remain but two out of the above, viz :—

*S. plumosus*,—R. Br. ; and

*S. litoralis*,—Schrader.

To these we must add, however, *S. pectinatus* Roxb., because Nees (in Linnæa, IX. 2921) has kept Roxburgh’s species distinct from Schrader’s *litoralis*.

[Note.—In the Prod. Fl. Nov. Hollandiæ *S. plumosus* is contrasted with the “Caribbean” *S. validus* of Vahl’s Enumeratio, but *S. subulatus* is not mentioned.]

Miquel’s Flora of the Dutch Indies (1855) contains only one *Scirpus* of the “*Malacochæte*” type, which is given as *Scirpus subulatus* Vahl, Roxburgh’s *Scirpus pectinatus* being cited as a synonym, also Nees’ *Malacochæte*.

Nothing is said about *S. litoralis* or *plumosus*, although Steudel is referred to. “Further India” is given as the Batavo—Indian habitat (apparently) along with the Nicobars (as the external distribution presumably).

Miquel’s description follows Steudel exactly although not *verbatim* ; but Steudel’s does not fit with Vahl’s whose *S. subulatus* had a trifid style, while Steudel’s description brings his species near *S. litoralis* by the style being *bifid*. Steudel does not give the solitary habitat from which Vahl’s plant had been gathered when the “*Enumeratio*” was published, and as he cites Roxburgh, and his description tallies with Roxburgh’s sufficiently, the probability is that he had *S. pectinatus* in his eye exclusively.

There are no specimens of Vahl’s *S. subulatus* in Hb. H. B. C. nor in fact of any *Scirpus* of the “*Malacochæte*” group from the Nicobars or regions adjoining : and it seems likely that none of the subsequent authors who have quoted or described what they understood to be his plant had a specimen from the Nicobars before them.

Boeckeler in the XXXVIth issue of Linnæa (1869—70) described the *Cyperaceæ* of the Royal Hb. Berlin, and has given a key to the species of *Scirpus* taken up by him. This has a group under the first main section (A. squamæ apice rectæ) which is distinguished by the segments of the perigonium being fimbriate-ciliate: this group includes three species, viz:—

*S. subulatus*,—Vahl

*S. triqueter*,—Linn.

*S. riparius*,—Presl.

It may be noted that these are referred to a sub-section having glumes entire (squamæ integræ) which is inapplicable to several of the forms which he has assigned to *S. triqueter*.

Moreover he has reduced *S. fimbriatus* Del. (or as he gives it, following a misprint in the Index to Steudel, "*fimbriatus*") and *S. litoralis* of Schrader to *S. triqueter* of Linnæus, which is certainly erroneous.

His *S. riparius* of Presl. is made up of several species of Steudel's plus some others subsequently edited, all American, of which most appear to be referable to the sub-genus "*Malacochæte*"; but for the purpose of this note the American forms may be neglected.

Under "*S. subulatus*" he cites:—

- (i) *S. subulatus* Vahl (but had apparently not seen authentic specimens),
- (ii) *Malacochæte pectinata* Nees, in whose Hb. he seems to have seen a specimen (from Wight probably);
- (iii) Wallich Hb.—No. 3506 B;
- (iv) *S. arabicus* Nees et Ehrenb in Hb. Berol;
- (v) Thwaites No. 831 from Ceylon; and
- (vi) Boivin No. 3051 from *Mayotte*, which is no doubt the island of *Mayotta*, one of the Oceanic group of the Comoro Isles, half-way between the *Mozambique Coast* and *Madagascar*.

As observed above, Thwaites No. 831 is in Hb. H.B.C. and is marked as *S. pectinatus* Roxb.

*S. Pterolepis* Kunth (= *Pterolepis scirpoides* of Schrader's *Analecta* Fl. Cap.) he makes var. B of *S. subulatus* without discussing the strongly marked diagnosis which is given for the Cape plant by its author. The Mascarene plant is not improbably the same as Schrader's *Pterolepis* or closely allied to it; but for want of specimens the writer is unable to suggest a place for either form.

In the *Flora Austral.* (l.c.) it is pointed out that Boeckeler was wrong in identifying *S. litoralis* with *S. triqueter* of Linnæus and

of Schrader. From the remark that the areas of *S. litoralis* (Mediterranean region) and *S. plumosus* R. Br. (Australian continent) are distant, it appears that Bentham either had not seen Vahl's *subulatus* and Roxburgh's *pectinatus* or was not prepared to unite them summarily with *litoralis*.

In the *Flora Orientalis* *S. litoralis* is the only *Malacochæte* dealt with.

It is noted as—

- = *S. fimbrisetus*, Del.
- = *S. triqueter*, Gren. & Godr. and of Boeck. (l.c.) [not of Linn.]
- = *S. pectinatus*, Roxb.
- = *Malacochæte litoralis*, } of Nees.  
and *pectinatus*

The distribution given is S. France, Italy, Greece, Corsica, Crete, Cyprus, Anatolia, Syria,—Alexandria, the Fayum and the Great Oasis in Egypt,—N. Africa, Caspian region, and Afghanistan (Griffith.)

A variety (oligostachys) is added as found in what is probably a marsh (from the name) in Eastern Persia (Coll. Bunge).

Trimen (Fl. of Ceylon V. 77) gives *S. pectinatus* Roxb. as a synonym of *S. litoralis*, and notes that it inhabits tidal waters in Ceylon, occurring rarely.

In the Fl. Br. Ind. VII. 659 *S. litoralis* is noted as the only Indian species with the bristles plumose, and the synonymy is—

- = *S. subulatus*, Vahl, also Miquel
- = *S. fimbrisetus*, Del.
- = *S. pectinatus*, Roxb.
- = *S. triqueter*, Gren. and Godr. and of Boeck; (l.c.)  
not of Linn.
- = *Malacochæte litoralis*, } Nees.  
= *M. pectinatus*

It is also observed that it is part of Wall. No. 3506 C.

The weakness of the rhizome is noted, and the anthers are described as red-crested (Cf. Reichenbach's figure of *S. litoralis*.)

In the *Genera Plantarum* *Malacochæte* has not been accepted as a separate genus or even as a sub-division of *Scirpus*. It would be



convenient in some ways to retain it as a sub-genus, but in *Scirpus Kysoor* of Roxburgh (placed as a variety under *S. grossus* Linn. in Fl. Br. Ind.) the "setæ" are minutely plumose, and this species would logically be included in *Malacochæte*, while its natural affinities seem to be with *S. grossus* of Vahl, and with Mr. C. B. Clarke's series "*Sylvaticæ*."

The importance of the characters derived from the "setæ" cannot be correctly estimated until more is known of the morphology of the flower in *Scirpus* and its allies, and of the part played by the hypogynous bristles in the life of the individual. Where these are "plumose," all the floral whorls appear to be unsymmetrical, the actually anterior segments of the perigonium being more in number than the posterior and declinate. The flower of such a *Scirpus* would in fact be somewhat on the plan of a miniature *Gladiolus*. In *Scirpus pectinatus* and *S. litoralis* the anterior "setæ" seem to be pretty constantly four in number, of which one pair is opposite the axis, the others being pushed to the right and left of it by the ripening achene, which, as noted by Roxburgh, they embrace laterally. The plano-convexity of the caryopsis itself may be due to the same tendency. In the ripe floret of certain *Malacochætes*, there are two flattened scarious white ligules corresponding to the anterior setæ, and arising in some species apparently with them from a ring that surrounds the base of the caryopsis. Whether these have carried anthers,—or at all events produced pollen,—may be doubted, but they are, in all likelihood, modified filaments, and the whole of the "setæ" therefore in "*Malacochæte*" (also in *S. Kysoor* and *S. eriophorum* presumably) would thus be regarded as belonging to the staminary whorl, while the plumose setæ of the *litoralis* group, of which the hairs are certainly gland-tipped, and have been observed to be moniliform, would be comparable with the staminodes of *Palisota* (see fig. 31 in Engler and Prantl. II. 4, p. 62). Roxburgh says of *S. Kysoor* that it has the setæ always five in number, and examination of fresh specimens would no doubt confirm his observation. In the *S. litoralis* group the writer finds the plumose segments of the perigonium to be always four in dried specimens, but living material is wanted to clear up the variability in the development of setæ in this genus.

A key is appended to those forms of *Scirpus* found in Europe, Asia and Australia, which, on the above view, have three or more of the perigonial "setæ" (in the fertile florets) developed as penicillate staminodes.

+ Nut plano-convex

\* Style bifid

O Culms rooting separately

Δ Sheaths without laminae.

1. Main involucre bract longer than the effuse panicle ... *pectinatus, Roxb.*

Hab. Sea coasts and estuaries  
of Ceylon and India, Sundri-  
ban (Kurz!) Coromandel  
(Heyne!) Ceylon (Thwaites)  
Dist:—(Not known.)

2. Main involucre bract shorter than the rather compact panicle... *plumosus, R.Br.*

Hab. Coasts of Australia (!)  
Dist:—(uncertain)

- Δ Δ 3. Sheaths with distinct (sometimes submerged) laminae ... *litoralis, Schrad.*

Hab. Rivers and lagoons (in  
brackish water only ?)  
Affghanistan (Griffith ex Boiss.)  
Waziristan (Stewart!) Punjab  
(Stewart and others!) Kathiawar  
(Mehta in Herb. R. E. P. !)  
Ahmedabad (Burkill!) Rajputana  
(King!) Central India (Vicary !  
Duthie !)

Dist:—Persia, Central Asia, Egypt,  
Mediterranean to S. Portugal.

- O O 4. Culms and barren shoots (phyl-  
loides) several from a common  
rhizome ... *sp. adhuc non descripta*

Hab. Lakes and marshes  
Kashmir (C. B. Clarke !)  
Baluchistan (Duke !)  
C. A. MacMahon !  
Dist:—(Punjab Salt Range ?)

\* \* Style 3-fid

5. .... *subulatus, Vahl*

Hab. Nicobar Isl.  
Dist:—(unknown).

++ Nut trigonous

6. .... *Kysoor, Roxb.*

Hab. Ponds and marshes. S.

Bengal (Burkill!) Chota

Nagpur (C. B. Clarke!)

Dist :—(endemic).

The above (as well as the subjoined additional species of *Scirpus*) is altogether provisional, but put forward in the hope that it may draw the attention of local botanists to the group, and lead to the collection of further material.

Descriptio sp. No. 4, antecedentis.

SCIRPUS WARDIANUS.

3-5pedalis, erectus, culmis pluribus, ex rhizomate rotundo sæpe incrassato, radicillis fibrosis undulatis nigris circumdato, exorientibus, floriferis lævibus rigidis obtuse triquetris, foliis (phyllodiis) planoconvexis spongiosis culmis floriferis elatioribus, involucrio universali erecto paniculam aequante vel supereminente, paniculæ ramulis parum effusis, spiculis oblongis uncialibus albescentibus, squamis inferioribus acuminatis sterilibus deciduis, mediis nuciferis apice retuso subpersistentibus, omnibus scariosis pellucidis margine integerrimo spinulis microscopicis ornato carina flavida in brevissimum mucronem excurrente, perigonii setis anterioribus quatuor, duobus caryopsidis plano-convexæ obcordatæ breviter stipulatæ ad apicem styli frustulo minuto armatæ duo latera amplectentibus.

A tall clubrush with several plano-convex barren shoots or leaves, which are very spongy, from the same rhizome as the flowering stem, which is rather slender for the group, but rigid, terete below, in the upper two-thirds bluntly triangular, sides slightly convex ;—spikelets fully an inch long, larger and more tapering than in *S. litoralis* ; branches of the panicle rather stiff ascending ; glumes without rust-coloured markings, those of the fertile florets very thin, wings almost transparent, keel pale-golden, gibbous near the base ; the lower empty glumes acuminate falling away from the rather stout notched rachis before the fruit ripens, when the spikelet bleaches. Nutlet narrowed at the base,—at the tip rounded, (under a high power) finely reticulated, colour olive turning to a chestnut-brown.

From *S. litoralis* Schrader, this should be easily distinguished by the presence of distinct "leaves" ; the strong rhizome and much larger silvery, not chestnut, spikelets.

It is nearer *S. pectinatus* and *S. plumosus* which may not improbably be found to form a single species, but the panicle is more effuse in *pectinatus*, and in neither is there any rhizome ; the Seistan plant

manifestly survives over one or more winters, while the other species, to judge from their weak attachments, may be annual.

Vern. *Tuzg*.—Sent by Col. C. A. MacMahon from the Helmund lagoons where it is gregarious and abundant, with *Arundo Donax* Linn., *Scirpus maritimus* Linn., and other fen plants of the temperate and sub-tropical zones of the northern hemisphere.

Named after the writer's friend, Mr. T. J. R. Ward of the Punjab Irrigation Department, who has supplied full and interesting notes on this collection of aquatic species from the Helmund.



*The Himalayan summer storm of September 24th, 1903, and the weather immediately subsequent to that date in Northern India.*<sup>1</sup>—By C. LITTLE, M.A. (With Plate vi.)

[Read March 2nd, 1904.]

Although in this paper some reference is made to the past two rainy seasons, the discussion in the main deals with occurrences towards the close of the monsoon season of 1903. My reason for making this arrangement is the belief that these later events bring into stronger relief the importance of considering to what these events are due. It will, I am sure, be obvious to all that until such occurrences can be fully accounted for afterwards, there is no prospect of their being foreseen with even a semblance of accuracy.

In the *Englishman* of September 15th, 1903, there appeared the usual weekly report of Meteorological observations at St. Xavier's College. To that report a note was added giving expression to the idea that the monsoon season had practically come to an end in Northern India. The note closed with the following sentence: "This year, 1903, there seems therefore to be greater fear for a speedy termination of the rainy period."

<sup>1</sup> In the Monthly Weather Review for September 1903, published in February 1904, the following is the summary of the weather in the former month:—

"During September 1903, the weather was more disturbed than usual over the Bay area and surrounding regions, occasioned by a series of small storms which was developed over the Bay, and thence progressed through the central parts of the country into Upper India. Over Western India, on the contrary, the weather was fairly quiet. The south-west monsoon was, on the whole, weaker than usual over the Arabian Sea, and the rains ceased at about the normal date over North-west India."